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MSTA

Montana Science Teachers Association

Volume. 5, No. 1 January 1986

Price Joins Corps of 1985 Presidential Honorees

Ken Price, teacher of chemistry and physics at Helena High, was the Montana science teacher selected for national honors in 1985. Ken and his wife Brenda, joined 51 other middle and secondary school science teachers and their spouses plus an equal number of mathematics teachers for a round of workshops, receptions and special tours in the Washington, D.C. area during October.

As part of his prize-winning application, our MSTA president identified the negative public concept of science education, in particular, and education, in general, as a problem to be solved. Ken has noted that the voting public includes more retired citizens than ever before. With people living longer, the proportion of citizens who have no children in school is increasing. Ken's solution is to make deliberate efforts to involve senior citizens in classroom activities, and to get high school students involved with their elders by putting on programs at Senior Citizens' Centers or other places where retired people congregate.

Ken's plans for the $5,000 award that goes to the winner's school is to use this money as seed capital for paying teachers' expenses to go to regional and national conferences. He has pledged himself to seek matching funds from business, industry, and private donors in order to develop a larger trust fund. Interest on the money would then be available for professional development grants for years to come.

Highlights of the Washington conference were inclusion of spouses in the festivities and travel (wife Brenda proved to be an effective lobbyist for elementary teachers of science, asking that they be considered for future awards); workshops at the University of Maryland to share ideas with other honorees; several receptions, including one at the State Department dining room ("elegant," says Ken) and one at the National Academy of Sciences where Ken had the privilege of meeting Nobel prize winning chemist Jerome Karl; visiting the White House; and meeting National Science Teachers and National Science Foundation representatives.

Industries also provided several gifts and prizes, including books, magazine subscriptions, a calculator, and an Apple computer.

Ken is still glowing over the experience of making new friends among professionals like himself and savoring the memories of his new experiences. Was it worth the tedium of filling out lengthy forms months ago? YES! Even if one has to do it several years in a row. If you are interested in this opportunity, write Bob Briggs, OPI, Helena, MT 59620 for application forms or call Debbie Watkins of NSTA, (202) 328-5800.

Honors Workshops for 1986: Opportunities for Teachers

During the summer of 1985, five Honors Leadership Workshops were held at five educational institutions around the nation. The workshops are part of the Honors Workshop Program, based at the University of Iowa and supported by a $1 million grant from the National Science Foundation. Last summer 155 teachers attended one of five workshops: Applications of Science held at the Florida Institute of Technology, Melbourne, FL; Science for the Gifted and Talented held at Temple University, Philadelphia, PA; Science for Middle School/Junior High held at the University of Arizona, Tucson, AZ; Science/Technology/Society held at the University of Iowa, Iowa City, IA; and Elementary Science held at the University of Wyoming, Laramie, WY.

The Honors Workshops recognize outstanding science teachers including Presidential Award winners, teachers selected by the National Science Teachers Association's Search for Excellence in Science Education Program, and other leaders in education. During the two-week period, workshop participants had an opportunity to share their own expertise as well as learn from other exemplary science educators. Participants are exposed to scientists and engineers and new advances in science and technology. Leadership skills are emphasized and participants identify directions in science education toward which they can share their expertise. New curricula are developed, papers are written, and plans are made for professional presentations. The dissemination of outstanding science education through outstanding science educators is a major goal of the workshop program. Ideas and activities begun by the workshop participants are carried on through the succeeding school year.

This summer's series of workshops was the second year of the three-year grant. During these first two years, the following science educators from Montana have attended one of the workshops: Rich Davey, Havre; Deborah Richau, Billings; Susan and Michael Weller, Sunburst.

For information about the workshop series for the summer of 1986 contact:

Dr. Robert E. Yager
Professor and Director of the NSF Honors Workshops
767 Van Allen Hall
The University of Iowa
Iowa City, IA 52242
(319) 353-3602

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"History is the race between education and catastrophe."
H.G. Wells

"We're betting on education."
Dr. Donald La Salle, Director
Talcott Mountain Science Center

1985-86 NSTA Search for Excellence Focuses on Environment, Technology

Do you have "something special" for environmental education at your school? Or do you make a special effort to involve other teachers or community leaders in explorations of science and technology's effects on society? You may want to consider seeking national recognition for your efforts.

The Search for Excellence in Science Education (SESE) Standing Committee of the National Science Teachers Association selected three new search areas for focus this 1985-86 academic year.

Areas for the new search are: 1) STS Revised (Science/Technology/Society); 2) Environmental Education; 3) Pre-Service Secondary.

Searches begin at the state level. Criteria for excellent programs and application materials are available to Montana teachers from Bob Briggs, Science Specialist, Office of Public Instruction, State Capitol, Helena, MT 59620.

Montana Science Needs Assessment Study

Copies of this needs assessment are available to interested teachers. Assessments were made in the following areas:

Elementary Principals
Secondary Principals
Secondary Math Teachers
Secondary Science Teachers
Secondary Computer Science Teachers
Secondary Foreign Language Teachers
Elementary Teachers

Please request those of interest from Bob Briggs, Science Specialist, Office of Public Instruction, Room 106, State Capitol, Helena, MT 59620.

Montana Academy of Sciences Annual Meeting
Request for Papers

If you wish to present a paper at the 1986 meeting of the Academy, please complete this form and send it to Linda Robinson, Teaching Science-Math Section, 4408 Pine Cone Road, Billings, MT 59106, before January 15, 1986. Titles received after that date will not appear in the printed program, but at the discretion of the Section Vice-President, may be presented during the sectional meeting.

1. Name of presenter _____
2. Background of presenter (who, where from, etc.) _____
   _____
3. Name of sponsor if presenter is a student _____
4. Complete address of presenter _____
   _____
5. Section in which paper is to be presented:
   _____ Biological Sci. _____ Pharm. Sci.
   _____ Env. Sci. _____ Phys. Sci.
   _____ Math & CS _____ Social Sci.
   _____ Micro _____ Teach. of Sci. & Math
6. Title of paper _____
   _____
7. Projector(s) required: 2x2_____; overhead_____. (Chalkboards and pointers will be available in each meeting room. If you require other kinds of instructional equipment, you must furnish your own.)
8. Do you plan to publish this paper or an abstract in the *Proceedings*? _____. If so, please submit a copy of the manuscript to your Section Vice-President at the meeting. The manuscript should be in final draft form and should conform to the format of recent volumes of the *Proceedings*.
9. Publication of articles in the *Proceedings* will be charged at $10.00 per printed page. If authors are members of the Academy, a maximum of two pages will be printed without charge.

1986 NSTA Summer Industry Honors Workshops

The 1986 NSTA Teachers Honors Workshops program for outstanding science teachers will offer two-week seminars for secondary teachers in physics, chemistry, and energy at participating industry facilities. Teachers will travel to the industry sites where they will hear lectures from practicing scientists, examine and work with new technologies, and visit laboratories and production sites. Each seminar will include time for participants to prepare lesson plans under the guidance of industry resources personnel. In the fall of 1986, participating teachers will present an inservice training session to teachers in the local school districts.

The honors workshops program will cover food, housing, and travel expenses. Housing, in most cases, will be in university dormitories near the company sites. Participants will each receive two graduate credits from the University of Iowa and a $400 stipend for their time and commitment to the program and the followup inservice dissemination session.

The 1986 NSTA Teachers Honors Workshops program will be funded by participating companies and a National Science Foundation grant. All applicants must be currently teaching science at the high school or junior high level (grades 7-12). Individuals who wish to apply should complete the application and submit it with a letter of support from a principal or other supervisor stating support for the applicant and commiting assistance and resources to the applicant in conducting the required inservice session.

Participants will be chosen for the program by a selection committee made up of industry representatives and science educators. Those teachers considered best qualified by the committee on the basis of their applications and letters of support will be selected. The deadline for applications is February 28, 1986.

Request application form from:

Marily DeWall, Director
NSTA Teachers Honors Workshops
1742 Connecticut Avenue, N.W.
Washington, D.C. 20009

Montana Science Teachers Newsletter is published quarterly by the Montana Science Teachers Association and the State Office of Public Instruction.

Editor is Doris Simonis, School of Education, University of Montana, Missoula MT 59812. Send her your activity suggestions, comments, articles, and news about science teachers and science education you'd like to share.

Subscription is $8.00 annually. Send your check, made out to M.S.T.A., to Ken Price, President, MSTA, Helena High School, Helena, MT 59601.

1986 CMA Catalyst Awards

In 1957, CMA initiated its annual national awards program honoring college professors of chemistry and chemical engineering. Two-year professors were added to the program in 1967 and to a regional program in 1973. High school chemistry teachers have received annual regional recognition since 1964 and national awards since 1973.

In the past 29 years, more than 300 outstanding educators have been honored. Through these individuals, CMA honors the teaching profession and strives to enhance the public's appreciation for quality chemical education.

The CMA program, to our knowledge, confers the only awards reserved exclusively for two-year college professors in any field and equal honors for chemical educators in high school, two- and four-year colleges.

Deadline for nominations is January 30, 1986.

For information and nomination forms write to:

Catalyst Awards Director
Chemical Manufacturers Association
2501 M Street, NW
Washington, D.C. 20037

Who Are Our Students?

Do you remember Michael Leyden's paper in *The Science Teacher*, "You Graduate More Criminals than Scientists" (March '84)? It should be required reading. One of his many points is that only 1.2 percent of our high school graduates will end up earning an undergraduate degree in the sciences.

Why don't kids like science? This question was raised at the May meeting of the New York Academy of Sciences. Is it because we cover too much material in too short a time? Is it because the content is too esoteric? Or maybe our students recognize that fortunes are not made by those who pursue careers in science. Perhaps students do not gravitate toward science because, as one student expressed it, they cannot BS their way through it. No, according to the prevalent view, it is the impact that the teacher has upon the student that determines the future of the child.

Well, that sounds nice, but are history, English, and business teachers really that much more effective, exciting, and stimulating? By all means, remain enthusiastic. Communicate the sense of satisfaction that is available from science. Play upon the curiosity of the child. STIMULATE! But do not feel you must carry the burden for the future of science. Surely the motivating factors must be very complex and numerous. To rest them on the shoulders of the teacher is not only simplistic, it is inappropriate. It also avoids the real issue.

Sure, the Sally Ride's out there say that a specific science teacher changed their lives. But that is not our goal. We are not working to turn out graduating classes full of scientists. We want the "average" citizen to appreciate science (we can appreciate good music without being composers), to gain enjoyment from watching a television show or reading a magazine article about science (we do not need to be a playwright to enjoy a Broadway production), to feel sufficiently comfortable about science, to become an effective participant in social issues (who needs to be a geologist to have intelligent thoughts about the pros and cons of strip mining?). We want to open doors, to maximize potentialities for students, to give them the best chance for success in life. These goals cannot and should not be measured by the number of students who become Nobel Laureates. This is not to say immense pleasure is not derived when someone follows in our footsteps--we all like that kind of ego stroke--and, of course, we help that student as much as we can. Advanced level classes are important, too. There is a real and significant need for them for some students. But we must remember that our primary mission is not to increase the number of engineers in this country or even to raise the ETS national average. Our over-riding goal should be to contribute to the creation of an educated citizenry. All else follows from that.

Editor, Connecticut Science Teachers CSTA Newsletter, *May-June 1985.*

NOTE: I will be glad to send you a copy of this excellent article if you write to me at OPI, but I would strongly recommend that every library carry "The Science Teacher" for secondary and "Science and Children" for elementary. It's a must!!

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"We ask why elementary and secondary teachers leave their profession, when often their students make more money immediately upon graduation than they do. We wonder why they do not get more done, when we overload them with paperwork...We ponder why they are not better trained, when few opportunities exist for career development. The first step toward improving education is to stop blaming teachers and start helping them: If we want more skilled teachers, we must help them improve their skills. And if we want to keep them, we must reward, respect, and thank them."

Ex-Vice President Walter Mondale

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"The Ford Foundation has estimated that by 1990, fully 90 percent of the *married women will be in the work force. At the current rate of divorce, widowhood, and disabled husbands, fully half of today's women will be the principal wage earner in their families...If your daughter is able and fails to study at least four years of mathematics in high school, her personal academic development in high school, career possibilities, and her earning potential all will be severly limited."*

Dr. James Nicholson, Darien H.S.
Math Dept. Chairman, Darien, Connecticut

Teacher Honored

We are most pleased to announce that Don Neu was selected as one of the outstanding teachers and invited to attend the second national symposium, "In Honor of Excellence" in education, along with an outstanding teacher and principal from each state.

The symposium was held November 21-25, 1985, at the South Seas Plantation resort on Captiva Island, Florida. Burger King Corporation assumed all expenses for the symposium, including air travel to and from Captiva Island.

The symposium focused on national and local attention on those educators who are helping to set the standards for educational excellence, and perhaps inspire their colleagues across the country to strive for the same high level performance. In addition, the symposium provided an opportunity for continued professional growth and development.

MSTA Regional Meetings

Linda Robinson, the MSTA Regional Director for Wheatland, Golden Valley, Musselshell, Treasure, Big Horn, Carbon, Stillwater, Sweet Grass, and Yellowstone counties, has been given a mini-grant from MSTA to pilot the regional MSTA meeting concept. MSTA was initially set up to utilize this kind of grass roots organization, and our president, encouraged by MSTA's growth and success, is ready to explore the possibility.

New Director Plans Montana Science Fair at U.M. in April

Dr. Charles Eyer, Associate Professor of Pharmacy, has been named new director of the Montana Science Fair in anticipation of its 31st annual exhibition in 1986. Eyer will have strong assistance from Dr. Science Fair Emeritus, Len Porter, and MSTA member Judy Martin. Both Eyer and Porter hope that everyone who has participated in the past will continue to do so.

Encourage your junior and senior high school students to begin projects that demonstrate their interests and skills in science. There are many categories available for consideration. Students in grades seven and eight will compete in physical sciences and biological sciences within their grade levels. Top awards in these categories are silver and bronze medals.

Students in grades nine through twelve can select from the following categories: biochemistry, medicine and health, environmental studies, microbiology, physics, engineering, mathematics, zoology, behavioral and social sciences, earth and space sciences, chemistry, botany, and computer science. The top winners from high school entrants will win gold medals and expense-paid trips to the International Science and Engineering Fair in Fort Worth, Texas, held May 11-17, 1986.

The Montana Science Fair will be open to the public April 11-12, 1986, at Adams Field House on the University of Montana campus, Missoula. Registration forms and background information on the science fair will be mailed to science teachers early in January. Applications must be postmarked by April 1, 1986.

Certification forms are required for any proposed experiment by a high school student using vertebrates as subjects. Teachers whose students plan such use should contact Charles Eyer as soon as possible at 243-4621 or 243-4872. Seventh and eighth grade students conducting experiments with vertebrates need no special certification, but teachers should ensure humane treatment of subjects by their supervision of test conditions.

Educational Plans for Shuttle Mission 51-L Announced

Live lessons to classrooms around the country and scientific demonstrations filmed for use in educational products are just some of the activities that will be involved with Shuttle Mission 51-L and the flight of the first Space Flight Participant.

Christa McAuliffe, the finalist in the NASA Teacher in Space Project, along with Barbara Morgan, the back-up candidate, reported to NASA's Johnson Space Center, Houston, on September 9 to begin training which will continue until the flight of 51-L now set for launch no earlier than January 22, 1986.

NASA is making plans for a direct satellite broadcast and schools will be able to observe lessons from space. The Office of Public Instruction hopes to have these lessons on videotape for loan to interested teachers!

The first live lesson entitled "The Ultimate Field Trip" will allow students to compare daily life on the Shuttle with that on Earth. McAuliffe will take viewers on a tour of the Shuttle, explaining crewmembers' roles, showing the location of computers and controls and explaining experiments being conducted on the mission. She also will demonstrate how daily life in space is different from that on Earth in the preparation of foods, movement, exercise, personal hygiene, sleep and the use of leisure time.

The second lesson called "Where We've Been, Where We're Going" will help the audience understand why people use and explore space by demonstrating the advantages of manufacturing in the micro-gravity environment, highlighting technological advances that evolve from the space program and projecting the future of humans in space.

Physics Workshops Held

During June 1985, the American Association of Physics Teachers held a Physics Teaching Resource Agent (PTRA) Institute at the University of Northern Arizona in Flagstaff. Teachers participated in a series of workshops dealing with teaching strategies and techniques that would not only improve their own classroom performance but would assist these teachers in leading workshops and inservice activities within their own regions and states.

Objectives of this program are to use these physics teaching resource agents to strengthen academic qualities of secondary physics teachers by doing the following things:

1. Training and retraining high school physics teachers in exemplary teaching strategies and techniques.
2. Presenting content knowledge and recent advances in physics.
3. Training physics teachers in new technological innovations.
4. Providing special training in techniques and teaching behaviors that affect student performance.

Montana is privileged to have two PTRAs. For further information on this program and how to get inservice for you or your school, please contact the following two people: Glenn A. Goverstsen, Sentinel High School, 901 South Avenue, Missoula, Montana 59801 OR Michael G. Jablin, 2206 Monad Road, Billings, Montana 59102.

Science Safety Grant

The Montana State University Science/Math Resource Center (SMRC) has been awarded a $26,000 grant from the Office of Public Instruction for eight regional science safety workshops. The scope of this project involves the integration of university, public and private school educators and concerned public officials to increase safety awareness and to improve safety practices. Some items to be included are as follows:

1. The scope of the problem of safety
2. Needs assessment implications
3. Legal aspects of laboratory safety
4. Student involvement and responsibilities
5. Eye and face protection
6. Procedures for handling chemical reagents
7. Storage and disposal of chemical reagents
8. Labeling and handling of glassware

9. Biological and animal hazards
10. Ventilation
11. Fire control
12. Laboratory safety hardware
13. Recordkeeping
14. Safety audits
15. Evaluations

The eight identified workshop sites for the remainder of the 1985-86 school year will be Kalispell, Missoula, Dillon, Great Falls, Bozeman, Billings, Glasgow, and Miles City. We expect this project to be very beneficial to our teachers in the state of Montana.

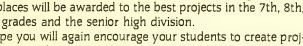
The first workshop was held on December 6-7, 1985. The second will be held at the University of Montana, University Center, Mt. Sentinel Room on January 10-11, 1986. It will begin at 8:00 a.m. on Friday and finish at 5:00 p.m. on Saturday. Two credits are available. Contact Russ Hartford or Gary Freebury at Flathead High School in Kalispell at 755-7130 ext. 50, for further details.

Energy Awards

The Montana Energy Education Committee again wishes to recognize those students who have developed and exhibited outstanding projects focusing on energy or energy-related fields and technology at the Montana State Science Fair.

The committee provides energy information and materials to educators and students across the state. One of our major activities will be to promote energy awareness in the junior and senior high schools in the state by making monetary awards to outstanding projects at the State Science Fair next spring. First and second places will be awarded to the best projects in the 7th, 8th, and 9th grades and the senior high division.

We hope you will again encourage your students to create projects expressing their ideas about energy, its sources, utilization and conservation and enter them at the Montana State Science Fair next spring.



RESOURCES FOR TEACHERS

Anthro Notes, a FREE newsletter for teachers, is published three times a year by the National Museum of Natural History. The Fall 1985 issue has a lengthy article on the Native Americans of Fort Belknap, Montana, and methods used in creating their ethnohistory. Another feature on "Teaching Human Origins" includes an annotated bibliography of material on evolution, extinction, fossils, and human origins that can be useful to earth science and life science teachers in particular. To get your name on the mailing list, write: Ann Kaupp, Department of Anthropology, Stop 112, Smithsonian Institution, Washington, D.C. 20560.

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Laboratory Science and Art for Blind, Deaf, and Emotionally Disturbed Children is a goldmine of activities for elementary school children, both "mainstreamed" and normal classmates. Published in 1978, only a few copies of this hard-bound, large format treasury of hands-on activities are still available from the author. Send $20 to Dr. Doris Hadary, American University, Massachusetts and Nebraska Avenue, Washington, D.C. 20016.

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Humane Education is the topic of brochures titled, "Does the Idea of Dissecting or Experimenting on Animals in Biology Class Disturb You?" and "The Living Science: A Human Approach to the Study of Animals in Elementary and Secondary Schools." These publications suggest alternative labs for traditional dissections and vivisections. Request your free copies from: National Association for the Advancement of Human Education, P.O. Box 362, East Haddam, CT 06423.

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Comets, career-oriented modules to explore topics in science, has been tried, tested and proven to be a stimulating adjunct to science education in grades 5-9 (for Early Adolescents). NSTA has recognized its value and has printed *Comets Science*, 448 pp. 1984, over 100 teaching activities in all disciplines answering "why should we learn that?"; *Comets Profits* (320 pp. 1984) tells about 24 women working in science and includes activities to develop critical reading and writing skills.

These were developed with NSF support. $24 for the pair (Prepaid orders have no handling charge -- $2 otherwise). All middle/high school teachers' references should contain at least one set.

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Have you received that Vol. 2 #3 *IDEAS in Science on Papermaking* put out by AAAS science resources for schools? It contains many techniques for local paper making (no, Virginia, the computer will not put paper making out business). If you don't get their materials, try writing AAAS, 1776 Mass. Ave., NW, Washington, D.C. 20036.

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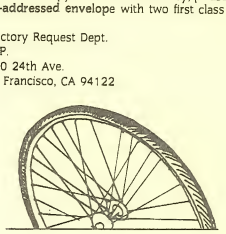
The 1986 illustrated *Selectory* (catalog) *of Astronomy Materials* is now available from the nonprofit Astronomical Society of the Pacific. Each item listed was selected by the Society's professional staff for its scientific and educational value and for its visual appeal. Some items are available at a significant discount and many are produced and distributed exclusively by the 97-year old Society.

Included in the 1986 Selectory are slides, posters, charts, computer software, tapes, observing aids, and information packets about a variety of astronomical topics. For example, the catalog includes some of the best books, posters, software, and other finding aids for Halley's Comet, and a new slide set about upcoming space astronomy missions.

To obtain a free copy of the 1986 Selectory, please send a **legal-sized self-addressed envelope** with two first class stamps on it to:

Selectory Request Dept.
A.S.P.
1290 24th Ave.
San Francisco, CA 94122



On Earth

We have all heard 'gold is where you find it.' The saying is probably a misinterpretation of the Biblical verse, 'Surely there is a vein for silver, and a place for gold where they fine it'. Although the poet meant there was a place for gold, which they 'refine', the idea remains that gold is capricious. It is the task of our scientists to ask 'why is it where it is?' We may find new deposits if we can discover why gold occurs in certain geologic environments.

There is a lot of gold in the Earth, but compareed to other materials, it is rare near the surface. A cubic mile of 'average' rock from Earth's crust would yield, if smelted, 260 millions tons of magnesium, 12 million tons of manganese, 1,000 million tons of aluminum and 625 milion tons of iron. Those are all abundant materials. At the other end of the scale, the rock would also contain rarer materials, including a million tons of zinc, 650,000 tons of copper, 185,000 tons of land, and 60 tons of gold.

In general, gold deposits rich enough to mine are found in stream beds and mountains. Those two environments account for most of the world's gold.

Stream bed deposits, called 'placer' deposits, are the easiest for an amateur to seek. Placer gold drew the '49ers' to California, and is still sought by prospectors today. Streams move flakes and gold nuggets toward the sea.

The gold stops for a time—a day, a century, a thousand years—in a lake or inland sea. Perhaps it stays there until the lake dries, becoming placer gold streaks in the mud and sand of what was once the bottom of the lake. In time the mud and sand may turn to stone, trapping the gold again in rock.

Or, the deposits in rivers carrying gold may themselves be 'turned to stone'. Thirty million years ago in California, streams were suddenly covered by volcanic ash and lava, preserving the sand and gravel, as well as gold, beneath a layer of hard rock. Canny miners of the last century recognized the ancient placers and robbed the vanished streams of their gold.

Mines of the Witwatersrand, South Africa, are delving into stream beds more than a billion years old. The mines have produced more than $10.5 billion worth of gold since 1885, and now account for about half the world's annual production.

Gold got into those placer deposits by the wearing down of rock mountains. Not all mountains contain gold. If they did, the metal would not be as scarce as it is. But mountains made of many different kinds of rock, from a few million to billions of years old, have contained gold. Quartz veins, in or near granite mountains, have been sources of gold, but there is no guarantee that they will contain the yellow metal.

'A vein of solid gold' is a phrase often found in stories of lost mines. Most tales go something like this: 'While looking for a lost scarf (or horse, or cow, or shoe), X picked up a shiny pebble. He saw that it was gold. Carefully, he traced it back into the mountains where he found a vein of solid gold. He left, vowing to return, but he could never again find the vein of solid gold.'

And no wonder! Large, solid gold veins don't exist.

The idea of veins gave us a difficult part of our American mining law. If a prospector finds gold in an outcrop on the surface, he can follow that outcrop (the vein) wherever it goes underground. That can lead to all sorts of legal problems. Veins may be broken or displaced; one may divide, or two may converge; one may turn so as to come to the surface again (where someone else may have claimed it). Some mines join one another underground, and minor wars have been fought over who owns what where.

Not all mines follow veins. In the Homestake mine near Lead, S.D., largest producer in the U.S., gold is so finely scattered through the rock that it is virtually invisible. It is surprising that the deposit was ever discovered, yet it has been mined steadily since 1878.

Homestake is unusual also because the ore is very uniform, and has been mined downward for more than a mile with no limit yet to be seen. But the ore is not rich. It averages half an ounce of gold a ton.

Why gold should be at Homestake is a geologic puzzle. At least one geologist thinks the gold was formed in a huge, ancient hot spring. Perhaps so: A modern hot spring at Steamboat, NV., is depositing small amounts of gold today.

Finding a new mine in hard rock is not easy. Most of the world's rockbound gold deposits have probably been discovered where flecks of gold are large enough to see. New mines will probably have 'no-see-um' ore, like Homestake, or the Carlin deposit in Nevada. The largest gold discovery of the last 50 years, the Carlin deposit contains about $120 million in gold. Scientists from the U.S. Geological Survey pinpointed the area by using a combination of geophysical and geological interpretation and chemical testing.

'The Earth', wrote the Biblical poet later in his psalm on resources, 'has the dust of gold.' Much of the remaining gold is dust, and will require sophisticated techniques to be found and recovered.

Mary Hill
Department of Geosciences
San Francisco State University
San Francisco 94122

Reprinted with permission from *Earth Science*, Spring 1985.

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GOES-1 is dead. This was our oldest geostationary weather satellite. Launched in 1975, it had a life expectancy of 3 years. It did not fail for 9.5 years, until February 3. The reason for the final failure: the filament in an incandescent lamp which was used to position a radiometer burned out. Controllers will boost GOES-1 at least 200 km above geosynchronous orbit so it will not interfere with other satellites in that crowded orbital pathway.

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All restrictions on teaching evolution have been eliminated in Texas. At the State Board of Education textbook hearing in November, "creationist protests against these steps were listened to politely—and ignored," according to the pro-evolution group, The Committees for Correspondence, sponsored by the National Center for Science Education. The Committee in association with the Iowa Academy of Science has recently issued a 74-page paperback, "Reviews of Thirty-One Creationist Books," ($5 plus 50 cents postage and handling). It also publishes the bimonthly Creation-Evolution Newsletter that you can subscribe to for $5 a year. Volunteers interested in working on these publications are welcome. Write for further information or ordering to: NCSE, 23 Chelsea Dr., Syosset, NY 11791.

The Perils of Bad Breath

Why do garlic, onions, and other pungent foods impart a lingering odor to the breath?

The odor doesn't come from the stomach, because the gullet opens only occasionally, generally remaining collapsed like an empty toothpaste tube, according to Claire Reyner in *Everything Your Doctor Would Tell You If He Had The Time.*

And it's not because of remnants of the foods that linger in the mouth.

It's because the molecules that give food a pungent aroma pass through the stomach walls and into the bloodstream, then into the lungs, from which they are expelled in the breath.

Wildlife Film Festival

The University of Montana Student Chapter of the Wildlife Society will sponsor the Ninth International Wildlife Film Festival (IWFF), April 7-13, 1986, at the University of Montana at Missoula.

The primary purpose of the festival is to encourage excellence in all aspects of wildlife films. The IWFF provides film and video competitions, awards, workshops, educational events, and showings. Festival plans include a live wildlife program transmitted from the Lee Metcalf Wildlife Refuge, a wildlife writer's conference, and a symposium on the interrelationships and influences of wildlife science and the humanities.

For those interested in submitting their work in competition, the deadline for applications and films is **March 17, 1986.** All entries must have a predominantly wildlife theme and have been produced or released during the calendar year 1985. Categories include amateur, professional, commercial, scientific, TV series, and experimental films. Winners will receive certificates, and the results will be internationally published.

For more information, rules, application forms, and the festival agenda, write or call Wildlife Film Festival, Wildlife Biology Program, University of Montana, Missoula, MT 59812; (406) 243-4493.

Making a Comet in the Classroom

By Dennis Schatz
Pacific Science Center

A dramatic and effective way to begin your unit on Halley's Comet is to make a comet in the classroom. The ingredients are easy to locate and teachers find that it provides a visual image that students cannot forget.

The ingredients for a six-inch comet are:

2 cups water
2 cups dry ice (frozen carbon dioxide)
2 spoonfuls of sand or dirt
dash of ammonia
dash of organics (dark Karo syrup works well)

Other materials you should have on hand include:

large mixing bowl (plastic if possible)
4 medium sized garbage bags
work gloves
hammer, meat pounder, or rubber mallet
large mixing spoon

Dry ice is available from ice companies in most cities. Look under "ice" in the Yellow Pages for the closest source. Day-old dry ice works best, so buy it on the afternoon before the day you do the activity. Keep the dry ice in an ice chest when transporting it and in your refrigerator's freezer overnight. Most ice companies sell a minimum amount of ice (usually 5 pounds). Extra dry ice is useful because some will evaporate and you will want to try the recipe before doing it with the class.

Steps for making one 6-inch comet (students make good baker's assistants)

1. Cut open one garbage bag and use it to line mixing bowl.
2. Have all ingredients and utensils arranged in front of you.
3. Place water in mixing bowl.
4. Add sand or dirt, stirring well.
5. Add dash of ammonia.
6. Add dash of organics, stirring until well mixed.
7. Place dry ice in 3 garbage bags that have been placed inside each other (be sure to use gloves while handling dry ice to keep from being burned).
8. Crush dry ice using hammer.
9. Add dry ice to rest of ingredients while stirring vigorously.
10. Continue stirring until mixture is almost totally frozen.
11. Lift the comet out of the bowl using the plastic liner and shape comet like you would a snowball.
12. Unwrap comet as soon as it is frozen sufficiently to hold its shape.

Place the comet on display for students to watch during the day as it melts. The comet is reasonably safe to touch without getting burned by the dry ice, but it is still best to have a spoon or stick for students to use while examining it. As the comet begins to melt, the class may notice small jets of gas coming from the comet. These are locations where the evaporating carbon dioxide is escaping through small holes in the still frozen water. This type of activity is also detected on real comets where the jets expel sufficient quantities of gas to actually change the orbit of the comet.

After several hours, the comet will become a crater-filled ice ball as the more volatile carbon dioxide evaporates before the water ice. Real comets probably do the same, ultimately breaking into several smaller pieces and even completely disintegrating. In some cases there may be a solid rocky core that is left to travel around the sun as a dark barren asteroid.

Reprinted from *Washington Science Teachers' Journal*, Fall 1985.

NABT Adopts New Teaching Standards and Will Develop Standardized Test

The National Association of Biology Teachers has recently revised its standards for pre- and in-service training of high school biology teachers. The guidelines suggest the types of courses and activities all future and current teachers should pursue in order to qualify as teachers of life science.

In addition, NABT, in cooperation with the National Science Teachers Association will develop a standardized high school biology test for use by teachers across the country.

For further information contact: Patricia J. McWethy, Executive Director, NABT, 11250 Roger Bacon Drive, #19, Reston, VA 22090. Phone: (703) 471-1134.

Physics in an English Kitchen

ISTA Spectrum has learned of a physics professor in England, Nicholas Kurti of Oxford, whose interest in cooking has led him to explore physics in the kitchen. For example, he uses a thermocouple to regulate a cooking souffle, a vacuum pump for making meringues quicker and lighter than before, and a hypodermic syringe for marinating. Kurti says that pineapple juice injected into pork a half-hour before cooking will tenderize the meat nicely--so long as it's fresh pineapple juice.

Since Kurti's most impressive scientific contributions have been in the area of low-temperature physics, it is not surprising that one of his original recipes is Inverted Baked Alaska, a Baked Alaska with the ice cream on the outside and the sponge cake and jam in the middle. Kurti makes his Baked Alaska inside out so that they can be baked in a microwave oven. The microwave will not melt ice, so the ice cream stays frozen.

Montana Science Teachers Association
Application Form

Name _____
City _____
County _____
Business Address _____
_____
_____
Home Address _____
_____

Grade Level	Grades Taught	Subject Area
☐ Elementary	_____	_____
☐ High School	_____	_____
☐ College	_____	_____

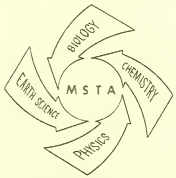
MSTA will help the individual participate in determining the destiny of science education in Montana. The organization serves as a vehicle for educators from all professions to exert positive influences on young people. Many important decisions concerning the scope and direction of science education will be strongly influenced by our organization.

The MSTA goals are to increase public awareness, interest and support of science education in Montana.

Membership Dues are $8.
Make checks payable to:

MSTA
Ken Price, President
Helena High School
Helena, MT 59601

Montana Science Teachers Association



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